

Indian Explosives Act (IV of 1884)
Indian Petroleum Act (VIII of 1899)

TWENTY-FIRST ANNUAL REPORT
OF THE
Chief Inspector of Explosives in India

*BEING HIS ANNUAL REPORT FOR THE YEAR ENDING
31ST MARCH 1920.*



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Twenty-first Annual Report of the Chief Inspector of Explosives in India.

No. 1219.

FROM

Dr. N. L. SHELTON, Ph.D., F.I.C.,

Officiating Chief Inspector of Explosives in India,

TO

THE SECRETARY TO THE BOARD OF INDUSTRIES

AND MUNITIONS, GOVERNMENT OF INDIA,

SIMLA.

Calcutta, the 10th July 1920

SIR,

I have the honour to submit herewith a report of the work of my department during the year ending 31st March 1920.

2. Lieutenant-Colonel C. A. Muspratt-Williams, C.I.E., R.A., the first Chief Inspector of Explosives with the Government of India, who started this Department in September 1898, went on combined leave on 9th March 1920 preparatory to retirement after nearly 22 years in the Department and I was appointed in his stead from that date. Major J. W. Turner, O.B.E., who officiated as Inspector of Explosives from 11th December 1905 to 12th December 1906 and was appointed permanently as Inspector of Explosives on 2nd December 1907 was granted 6 months privilege leave on 1st August 1919 preparatory to retirement and Mr. S. E. Bird, Personal Assistant to the Chief Inspector of Explosives, officiated as Inspector of Explosives till Major J. H. Allen from the Cordite Factory, Aruvankadu, who had been appointed to the permanent post, was able to take up the appointment on 1st December 1919. Major J. S. Rush, O.B.E., who held the other appointment of Inspector of Explosives from 13th December 1906, retired on 1st April 1920, and Lieutenant J. Bennett from the Cordite Factory, Aruvankadu, succeeded him.

3. During the year 1919, 189 licenses (four less than in the previous year) were granted in British India under Rule 46 and items 10 and 11 of Schedule II of the Indian Explosives Rules, 1914. The number of magazines licensed was 246 or 5 less than in 1918, and is in excess of the number of licenses granted, because in a number of cases firms have two or more magazines in one place under one license. A statement showing the number and location of the

magazines and also the number of licenses granted in British India during the year 1919 is given in Appendix A, and a statement showing the number of magazines and licenses granted during the past ten years is shown in Appendix B.

4. During the year, 261 inspections of magazines were made; a number of magazines being inspected two or three times. Those magazines are inspected most frequently which are situated in the neighbourhood of towns or in populous localities, or which contain large quantities of explosives, or any explosive which on account of its greater susceptibility to decomposition and possible ignition, it is considered advisable to examine and test more frequently than other explosives.

5. The magazines generally are in good order, and as usual magazine-owners have been found most willing to carry out recommendations even when involving considerable expense, and my thanks are due to them for making my duties easy in this respect.

6. The physical condition of all the explosives in the different magazines during the year was found to be good with the following exceptions, which were found to have become defective and were destroyed :—

- | | |
|---|--|
| (a) 524 lbs. Dynamite | } from Dewan Bahadur Ballabdas' magazine at Imalya. |
| (b) 4 coils safety fuze | |
| (c) 40 detonators | |
| (d) one .22 cartridge | } from the Dhanbaid Court magazine |
| (e) 2 lengths safety fuze | |
| (f) 195 detonators | |
| (g) 11 lbs. Dynamite from the Granite Co.'s magazine at Pallaveram. | |
| (h) 1,070 filled rifle cartridges | } from Messrs. Hafiz Ghouse and Co's magazine at Meerut. |
| (i) 6,000 empty cartridge cases | |
| (j) 5,250 percussion caps | |
| (k) 300 coils safety fuze from the Public Works Department magazine at Malakand. | |
| (l) about 46 lbs. Gollignite from the Public Works Department magazine at Mangla Head Works. | |
| (m) 66 detonators from the Public Works Department magazine at Aijal, Assam. | |
| (n) 1 maund 11 seers 13 chattaks un-serviceable gunpowder | } from the Barakar Coal Co.'s magazine at Layabad. |
| (o) 117 defective electric detonators | |
| (p) 4 defective electric detonators from the Rancegunge Coal Association's magazine at Kustore. | |
| (q) 388½ lbs gunpowder | } from the Assam Bengal Railway Co.'s magazine at Haflong by the collapsing of the magazine. |
| (r) 7½ coils safety fuze | |

7. During the year under report one theft of explosives during transit was reported to this office by the Government of Bengal.

8. One thousand five hundred and eight tons of explosives were imported into British India during the year 1919, the value being Rs. 21,45,018. Full details showing the different kinds of explosives imported, and the value of each, are given in Appendix C. A comparative statement showing the quantity of explosives imported during the last ten years is given in Appendix D.

9. A list of explosives at present authorised for importation into British India for general sale was published in the *Gazette of India* for information and is given in Appendix E.

PETROLEUM.

10. During the year under report, 854 licenses for the storage of non-dangerous petroleum, regarding which this department was concerned or consulted, were granted. This is an increase of 8 as compared with last year. A list of these installations, corrected up to 31st December 1919 and showing the districts in which they are located, is given in Appendix F, and a statement showing the number of licenses granted during the past ten years is given in Appendix G. In addition to the number of licenses shown in Appendix F, there are, of course, a very large number of storage godowns for the possession of non-dangerous petroleum in non-bulk, licensed by District officers, of which this department has no cognizance.

11. There are also a number of godowns licensed for the storage of dangerous petroleum in non-bulk throughout the country, and Inspectors of Explosives and the Chief Inspector of Explosives have inspected a number of these, when their existence has been brought to our notice or where they are near non-dangerous petroleum installations or contain more than 500 gallons of petrol.

12. In all 576 inspections of non-dangerous petroleum premises were made. 254 inspections of dangerous petroleum godowns were also made by this department during the year.

13. The large petroleum installations are usually under efficient European supervision and are in good order and well looked after.

14. The small or minor petroleum installations are installations in which not more than 50,000 gallons of kerosine oil in combined bulk and non-bulk are stored, and are looked after by Indian Agents, employed by the large oil firms. The oil for these installations is supplied from the major installations at the different ports, and the retail trade is carried out in them. A great deal of inspection of these minor installations has been done by this department during the last fourteen years, with the result that their condition is very much improved and the generality of them are in very good order. As a matter of fact when an installation is found not up to the mark at an inspection, it is usually due to the fact that some new Agent has been recently appointed who has not realised what is required of him. The oil companies do not hesitate to change their Agents if several unsatisfactory reports are made of the installations under their charge.

15. During the year 1919, 123,827,560 gallons of non-dangerous petroleum and 47,541 gallons of dangerous petroleum were imported by sea into British India. The details are given in Appendix H, and also the quantity of non-dangerous and dangerous petroleum produced in Assam and Burma during the year, as well as during the past ten years.

ACCIDENTS.

16. A list of accidents, with a short account of each, that have occurred with explosives, inflammable substances, dangerous goods, etc., between the 1st January and 31st December 1919, and that have been reported to this department, is given in Appendix I. It will be seen from a perusal of the details that the accidents have practically all been caused by gross neglect of ordinary precautions. In all there were 29 accidents causing 32 deaths and injuries to 95 persons. Comparative statements given in Appendices J and K show the total number of accidents and the number of persons killed or injured by them during the last ten years. As stated in previous reports, it is very doubtful whether all accidents that occur are duly reported to this department and, therefore, it is very possible that the statistics given are underestimated.

As a rule, the only accidents that are entered in Appendix I are those which cause loss of life or injuries or are important from some point of view.

Gunpowder, Class I.

17. There were five accidents from gunpowder during the year, causing eight deaths and injuries to sixteen persons.

Nitro compounds, Class III

18. Four accidents from Nitro-compounds causing one death and injuries to nine persons were reported during the year.

Fulminates, Class V.

19. No accidents from fulminates were reported during the year.

Ammunition, Class VI.

20. No accidents from ammunition were reported during the year.

Fireworks, Class VII

21. Four accidents from fireworks caused the death of one person and injuries to eighteen others.

22. There were twelve accidents from petroleum during the year, which were responsible for fifteen deaths and injuries to fifty persons. It will be seen from a perusal of the accidents in Appendix I that carelessness is a prominent feature in most of them. In India, the petroleum accidents are caused usually by lights being brought into proximity to oil vapour.

Petroleum

A number of fires were reported to this office as having occurred this year at the oil wells in the Burma Oil Fields. Owing to the effective fire service in the oil fields and to the considerable reduction of gas of late years in the Yenangyaung field, the fires have been restricted and prevented from spreading.

23. There was one accident from chemicals reported during the year, causing the death of five persons. The details of this accident, which are taken from the report of the enquiry committee, are as follows :—

Chemicals

“ On the ^{20th}/_{21st} September 104 drums of calcium carbide were discharged from S. S. “Tysla” overside into a B. I. transhipment boat in the river. The drums had an outer wooden casing and wooden ends fitting over the bottom and top of the drum and covering the circular cover on the drum top. The lid of the drum had a cardboard washer to render the drum air-tight. The B. I. transhipment boat, which contained other cargo also, went to No. 14 berth for release and after landing the other packages returned to the stream with the consignment of carbide of calcium which was not accepted for storage in the docks. On the 27th September Graham & Co instructed A. C. Choudhury, a stevedore, to send a country boat to Prinsep’s Ghat and release the B. I. boat containing the drums. The stevedore engaged the boat of one Ram Kissen—an open “blur” boat with living quarters and a shelter at the stern, and the drums were transferred. This boat lay in the river till the 17th when Grahams told the stevedore to send the boat to the S. S. “Calcutta” in the docks. The boat entered the docks on the night of the 17th with the 104 drums. The dock lock office record book, however, gives the extract from the boat note showing that the boat, No. 8084, carried 391 cases and packages of miscellaneous goods and makes no mention of calcium carbide.

Explosion of carbide of calcium at the Kidderpore Docks.

2. Twenty of the drums were put on the S.S. “Calcutta” on the 19th evening and the next day the whole cargo was taken except 43 drums which the ship rejected and returned to the manjhi, some in an open state. The manjhi covered them with a tarpaulin and went to eat his food with his crew, and during the meal found his boat on fire. The “Calcutta” cast the boat adrift and a tug working on the S.S. “Yeddo” at No. 29 berth picked up the boat in mid-dock and brought it to the quay between Nos. 27 and 29 sheds, where it was tied up. At No. 27 berth Mr. Blaquiere of the Port Commissioners was present. He noticed the boat smoking slightly and was told by one of the crew that the cargo was mutti (mud). The drums resemble cement drums, and taking it to be cement he put the emergency hose on. Flames leaped up and he dropped the hose and got a minimax extinguisher going. Meantime the

Fire Brigade had been summoned and arrived promptly with Mr. Hawkins in charge. The latter being told by Blaquiere that the boat contained cement, started a hose on it, but, seeing volumes of smoke and flame shoot up, lifted the hose, shut it off and proceeded to deal with the fire with sand collected in buckets and a pal from No. 26 shed. Captain Westbrook then arrived and took charge, and, having got the fire under with commendable promptitude, started to unload the drums on the clear space of quay between Nos. 27 and 29 sheds. This he did to extinguish the fire below the deck-boards. The drums which were mostly damaged either by the fire or during the removal to the quay from the boat—a drop of a couple of feet—were safely stocked. The wood-work on many was smouldering as they were hauled on to the quay, and there were petty fires on the quay owing to calcium carbide, escaped from the drums, being trodden on by wet feet.

3. Captain Westbrook then flooded and later pumped out the boat, which he moved slightly to the south along the quay to his salvago pump. After extinguishing the fire he considered his work was finished. Mr. Beddoo, who had arrived whilst the brigade were at work, saw the drums unloaded on to the quay and suggested dumping them overboard. This suggestion was not accepted and Mr. Beddoo quoted the rule about the immersion of wet calcium carbide in 20 times its bulk of water. Mr. Beddoo realised the danger of leaving the drums in their wet and damaged state on the quay and suggested dumping the lot into the docks, and gave the order to have this done. Captain Westbrook suggested taking it to the clear ground at the south of the docks, but the dumping was proceeded with and whole drums were thrown in. One of the first few drums dumped floated and emitted smoke and had to be retrieved and sunk close by the quay. At Captain Westbrook's suggestion the next few were holed at both ends and dumped. These did not sink at once; so, finally the drums were opened, when necessary, and the contents were poured over the quay edge at various places in front of No. 27 shed.

4. All went well till the 37th drum. As it was being rolled on its bilge (it was apparently an intact drum, but the enquiry committee have failed to trace it) to the edge by two coolies and had got to within a few feet of the edge, there was a terrific explosion and flames enveloped the two coolies, Lawless who was close by, and the two coolies who were rolling the next drum. The flames shot up 40 feet and their base circumference was about 10 feet and tapered to a few inches. The noise was like that of a big gun.

5. Sergeant Doran's evidence shows that after the explosion he saw from a boat that the whole jetty wall immediately below the spot where the coolies were, was blackened and ash coloured for some 8 yards, and Mr. Blaquiere gives positive evidence to a change in the wind from north to south-west just prior to the explosion. This change would drive the gas generated by the dumping on to the quay.

6. Four of the injured men including Lawless rushed from the spot of the explosion with their clothes burning. The fifth fell on the spot. The bystanders at once smothered the flames on them and they were removed to hospital, where they died.

II. The causes of the accident.

The immediate cause of the accident was the ignition of a large volume of an explosive mixture of acetylene and air.

The amount of carbide of calcium discharged into the dock was capable of generating more than 15,000 cubic feet of acetylene gas and the fine state of division of the carbide—less than $\frac{1}{4}$ " cube fostered to rapid evolution. The gas is somewhat lighter than air and diffuses upwards. A mixture with air in any proportions between 2 and 82 per cent will explode on ignition. Many thousands of cubic feet, therefore, of an explosive mixture were present at the time of the accident, and were being wafted over the edge of the dock by a gentle breeze. The question of what actually ignited it presents a difficulty, for no evidence was forthcoming on this point. The witnesses agree that there was no smoking and that the charred drums, although in some cases hot, were in no case smouldering while the discharge of carbide into the dock was proceeding. It should, however, be remembered that a smouldering

particle of wood which would be just evident in the dark would not betray its presence in bright sunshine, and it is possible that this was the igniting cause, for the explosive mixture has a low temperature of ignition. The gaseous mixture may have been ignited by a spark: portions of the warm dry quay were strewn with sand which had been used in extinguishing the fire—sand which consisted mainly of grains of quartz. This of itself might be sufficient, when abraded with the nails of a drum, to cause the familiar flint and steel phenomenon: other spark-producing substances were also present although in much smaller quantity, for a sample of carbide taken from a salvaged drum showed the presence of ferrosilicon and carborandum, the former well known for its capability of producing sparks, the latter one of the hardest substances known. It seems most likely, however, that ignition was caused by local overheating in portions of the wetted carbide. It is a common occurrence in carbide factories for spontaneous ignition to take place through the high temperature set up when carbide dust is in contact with a quantity of water insufficient for its complete decomposition (C. Bingham, "The manufacture of Carbide of Calcium," London, 1916, p. 105). All the factors for such an occurrence were there on the quay. Several witnesses have testified to the presence of small pools of water in shallow depressions on the quay and carbide dust from leaking drums was there in abundance.

The proximate cause of the accident may be said to be the dumping of well over a ton of carbide into the Dock.

The primary cause was the loading of drums of carbide on a boat totally unsuitable for their reception."

As a result of this explosion the question of the amendment to the Carbide of Calcium rules is under consideration.

24. Three accidents under the head Miscellaneous were responsible for
Miscellaneous accidents two deaths and injuries to two persons.

GENERAL REMARKS.

25. Eleven reports of inspections of these magazines by civil officers have
Government magazines in charge of civil officers been received in this office, and I have brought to the notice of the officers concerned any irregularities or defects which required remedying. There is no doubt that the introduction of this system of sending these reports to this office has been desirable, as even from the short time it has been in existence, I have come across a good many instances of ignorance and want of expert knowledge, which might have caused disasters. High explosives in these magazines had previously never been tested, and I have, in dealing with these reports, always recommended that samples of these explosives should be sent at least once a year to Chemical Examiners for test.

Three State Railway magazines have been inspected by this Department during the year, as the Railway Board desired that this Department should undertake those inspections.

26 On the 22nd August 1919 a license to manufacture and possess in a
Fulminate of Silver Factory Factory, Toy Fireworks containing Fulminate of Silver was granted by the Governor-General in Council to Messrs. Bonbonniere, Limited, Calcutta. The maximum quantity of free explosive allowed in the Factory at any one time was limited to 24 grains.

27. During the year the Government of India in Notification No. 7645,
Carriage of explosives of the 1st Division of Class 6 in Passenger Ships dated the 27th September 1919, amended the Indian Explosives Rules in order to allow of the carriage of explosives of the 1st Division of the 6th (Ammunition) Class in passenger ships which is permitted under the English Rules.

28 On the 14th April 1919 a Government of India Order, No. 222-T-13,
Carriage of Petrol by passenger train. (Railway Department) was issued giving the rules to be observed in times of great public emergency when the Military Authorities request the despatch of petrol

in large quantities by passenger train. The order is given in full in Appendix L.

29. During the year the Government of India sanctioned the transport of dangerous petroleum in bulk by rail, and conditions for this method of transport have been embodied in the Indian Railway Conference Association Red Pamphlet No. 4 against item No. 34 on page 29.

30. A fire broke out in a small shed used for soldering purposes which is situated at about 193 feet from the Port Trust Petrol Godowns at Sewree, Bombay. At the time of the fire there were 114 drums of 2 gallons and 8 drums of 4 gallons in the shed which had been moved there to be soldered. The whole of the petrol was destroyed. The matter was reported to this Department and the Chief Inspector of Explosives suggested the following measures for the prevention of such fires :—

1. No greater amount of tins should be allowed in the soldering shed than is absolutely necessary for practicable working.
2. The soldering irons must not be brought into the shed at a white heat.
3. The solderers or the person supervising them should see that there is no extraneous matter on the soldering irons at the time of soldering, such as bits of cloth, red hot scab, etc.
4. No ordinary lights should be brought near the shed.

In addition he suggested that it would be better for each Oil Company to have its own soldering shed and in that case each Oil Company could have more tins for soldering purposes in their own shed at any one time than they could have in a joint soldering shed where all the Companies had to be accommodated.

31. The number of inspections done by this Department during the year were 1094. To give some idea of the work and the ground covered, I give the following details of the work done by the Inspectors of Explosives.

During the 12 months, 1st April 1919 to 31st March 1920, the two Inspectors at Calcutta and Bombay were away from headquarters for 193 and 245 days and travelled 24,454 and 26,545 miles, respectively.

The Chief Inspector of Explosives was on tour for 78 days, travelled 8,799 miles, and inspected 48 explosives magazines and 113 petroleum installations and godowns, and went on inspection duty to the Burma Oil Fields and visited the ports of Calcutta, Madras, Bombay, Karachi and Chittagong.

32. This office is now permanently located in Calcutta at No. 1, Council House Street.

I have the honour to be,

SIR,

Your most obedient servant,

N. L. SHELDON,

Offg. Chief Inspector of Explosives in India.

APPENDIX A.

List of Magazines and Licenses granted under Rule 46 and items 10 and 11 of Schedule II of the Indian Explosives Rules, 1914, for the year 1919.

Presidency or Province.	District.	MAGAZINES			LICENSEES.		
		Under renewed license.	Under new license.	Total.	Renewed	New	Total.
Assam	Cachar	2	...	2	1	...	1
	Lakhimpur	1	...	1	1	...	1
	Nongong	1	...	1	1	..	1
	Total	4	.	4	3		3
Bengal	Burdwan	13	1	14	10	1	11
	Calcutta . . . . .	...	8	8	...	1	1
	Darjeeling	3	...	3	3	...	3
	Hooghly	4	...	4	1	..	1
	Howrah	1	...	1	1	..	1
	24-Pargannas	2	..	2	1	...	1
	Total	23	4	27	16	2	18
Bihar and Orissa	Gaya	2	...	2	2	...	2
	Hazaribagh	12	1	13	9	1	10
	Manbhum	16	...	16	14	...	14
	Sambalpur	1	...	1	1	...	1
	Singbhum	6	5	11	4	3	7
	Total	37	6	43	30	4	34
Bombay	Ahmedabad	4	...	4	4		4
	Bombay	19	...	19	13	.	13
	Broach	1	..	1	1		1
	Karachi	5	..	5	3	.	3
	Kolaba	2	..	2	2	..	2
	Panch Mahals	2	..	2	2	...	2
	Poona	5	.	5	4	..	4
	Ratnagiri	2	...	2	2	.	2
	Surat	2	...	2	2	..	2
	Thana	4	...	4	3	..	3
	Total	46	...	46	36	...	36
Burma	Bassein	1	...	1	1	.	1
	Hanthawaddy	4	...	4	2	...	2
	Lower Chindwin	1	...	1	1	...	1
	Mergui	1	..	1	1	...	1
	Northern Shan States	4	2	6	3	1	4
	Pegu	1	...	1	1	...	1
	Ruby Mines	1	...	1	1	..	1
	Tavoy	11	1	12	8	1	9
	Thatun	9	...	9	7	...	7
	Total	33	3	36	25	2	27

APPENDIX A—concl'd.

List of Magazines and Licenses granted under Rule 46 and items 10 and 11 of Schedule II of the Indian Explosives Rules, 1914, for the year 1919—concl'd.

Presidency or Province	District	MAGAZINES			LICENSES		
		Under renewed license	Under new license	Total	Renewed	New.	Total
Central Provinces	Amraoti	1	...	1	1	...	1
	Balaghat	3	...	3	3	...	3
	Betul	1	...	1	1	...	1
	Bhandara	2	...	2	2	...	2
	Bilaspur	1	...	1	1	...	1
	Chanda	3	...	3	2	...	2
	Chhindwara	3	...	3	3	...	3
	Nagpur	7	...	7	7	...	7
	Narsinghpur	2	...	2	1	...	1
	Raipur	3	...	3	4	...	4
Coorg	Total	26	...	26	25	...	25
	Mercara	1	...	1	1	...	1
	Total	1	...	1	1	...	1
Madras	Anantapur	3	...	3	2	...	2
	Chingleput	2	...	2	2	...	2
	Madras	17	...	17	5	...	5
	Madura	2	...	2	2	...	2
	Nellore	8	...	8	3	...	3
	North Arcot	2	...	2	2	...	2
	Salem	2	...	2	1	...	1
	South Arcot	1	...	1	3	...	3
	Tanjore	15	...	15	15	...	15
	Tinnevely	1	...	1	1	...	1
	Trichinopoly	3	...	3	3	...	3
	Vizagapatnam	2	...	2	1	...	1
Panjab	Total	68	...	69	38	...	39
	Rawalpindi	1	...	1	1	...	1
	Total	1	...	1	1	...	1
United Provinces	Lucknow	1	...	1	1	...	1
	Mcerat	1	...	1	3	...	3
	Shahjahanpur	1	...	1	1	...	1
United Provinces	Total	3	...	3	5	...	5

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SUMMARY.

Presidency or Province.	MAGAZINES.			LICENSES.		
	Under renewed license.	Under new license.	Total	Renewed	New.	Total.
Assam	4	...	4	3	...	3
Bengal	23	4	27	16	2	18
Bihar and Orissa	37	6	43	30	4	34
Bombay	46	...	46	30	...	36
Burma	33	3	36	25	2	27
Central Provinces	26	...	26	25	...	25
Coorg	1	...	1	1	...	1
Madras	58	1	59	38	1	39
Punjab	1	...	1	1	...	1
United Provinces	3	...	3	5	...	5
Total	232	14	246	180	9	189

APPENDIX B.

Summary of magazines and licenses granted under Rule 46 and items 10 and 11 of Schedule II for the ten years ending 1919.

Year.	MAGAZINES.			LICENSES.		
	Under renewed license	Under new license	Total.	Renewed	New.	Total.
1910	189	13	202	135	13	148
1911	190	27	217	139	19	159
1912	190	18	217	146	15	161
1913	210	25	235	151	21	172
1914	219	35	254	100	32	132
1915	238	13	251	179	12	191
1916	216	26	242	168	22	190
1917	226	26	252	175	23	198
1918	238	13	251	183	10	193
1919	232	14	246	180	9	189

APPENDIX C.

Statement showing the imports of explosives by sea into British India from other countries in the year 1919.

Explosives.	Bengal.	Bombay	Sind.	Burma.	Madras	Total.
<i>Quantity.</i>						
Gunpowder, black lbs	116,235	..	.	2,750	12,075	131,060
„ smokeless „	4,160	51,125	1,000	400	200	57,495
Dynamite „	219,908	8,000	.	26,000	160,100	414,008
Blasting gelatine „	92,052	5,000		12,000	270,500	359,552
Gelignite or gelatine dynamite „	63,951	200,600		122,000	203,000	601,551
Other nitro-compound explosives „	131,579	..		...	8,456	140,135
Detonators No	2,635,000	1,003,000		20,047	3,312,157	5,970,204
Fireworks lbs	85,470	9,93,417	20,297	170,555	65,443	1,291,131
Total	670,637	1,258,472	21,207	339,705	726,471	3,016,515
Total . No	2,635,000	1,003,000	.	20,047	3,312,157	50,70,204
<i>Value in rupees.</i>						
Gunpowder, black	1,01,857	..	.	3,343	12,033	1,17,833
„ smokeless	15,844	40,599	2,720	1,327	685	61,175
Dynamite	1,49,047	4,510		29,572	1,06,135	2,69,864
Blasting gelatine	63,144	8,925	..	13,295	1,08,391	2,78,065
Gelignite or gelatine dynamite	10,925	1,43,191		1,89,314	1,04,041	5,17,414
Other nitro-compound explosives	92,603	..	...		8,925	1,01,533
Detonators	51,103	14,261	.	478	45,601	1,11,512
Fireworks	82,590	4,82,569	15,108	57,647	20,777	6,67,691
Total	6,07,149	6,83,158	17,828	2,61,196	5,67,383	21,45,018

APPENDIX D.

Comparative statement showing the imports of explosives by sea into British India from other countries for the ten years ending 1919.

Explosives	1910	1911.	1912.	1913	1914	1915	1916.	1917	1918	1919
Gunpowder, black . lbs	249,702	229,069	354,853	213,713	210,821	197,867	111,265	96,450	62,503	131,060
„ smokeless . „	33,176	29,611	17,625	31,470	11,865	13,325	33,585	7,116	26,065	57,495
Aramonal . . . „		7,890	.		..	..			..
Dynamite . . . „	300,636	229,577	280,930	431,306	517,076	214,762	353,329	152,069	249,404	414,069
Blasting gelatine . . „	670,153	750,242	8,10,328	850,624	637,026	789,972	233,018	.	21,952	350,752
Gelignite or gelatine dynamite . . „	178,963	226,071	314,311	262,518	201,190	105,172	826,420	1,257,166	1,026,590	601,551
Other nitro compound explosives . . „	98,736	43,456	221,425	277,793	232,803	278,807	327,333	180,437	131,214	140,435
Detonators . . . No	2,637,556	3,216,789	3,649,010	5,928,850	4,823,900	4,258,500	6,366,000	4,667,000	4,780,612	5,970,204
Fireworks . . . lbs.	3,410,741	3,540,823	3,181,111	3,270,869	2,651,661	2,839,527	2,676,592	2,185,170	1,192,657	1,291,131
Total . lbs.	5,024,417	5,216,614	5,213,016	4,335,322	4,632,642	4,463,452	4,541,601	3,814,699	2,710,263	3,016,515
Total . No	2,637,556	3,216,789	3,640,010	5,928,850	4,823,900	4,258,500	6,366,000	4,667,000	4,780,612	5,970,204

APPENDIX E.

DEPARTMENT OF EXPLOSIVES.

NOTIFICATION.

Calcutta, the 21st April 1920.

No. 751.—With reference to the following Notifications publishing rules to regulate the manufacture, possession, sale, transport and importation of explosives, the following list of "Authorized Explosives" referred to in the rules mentioned against each Notification is published for general information:—

- Rule 4 (3) of Notification No. 4013-33, dated the 6th June 1914, of the Government of India, Department of Commerce and Industry.
 Rule 4 (3) of Notification No. 1183, dated the 11th November 1914, of the Chief Commissioner, Central Provinces, applicable to Beina.
 Rule 4 (3) of Notification No. 14, dated the 23rd April 1915, of the Resident in Mysore applicable to the Civil and Military Station of Bangalore and on the Railways in Mysore under British Jurisdiction.
 Rule 4 (3) of Notification No. 67-J., } of the Resident at Hyderabad applicable to the
 dated the 28th August 1914 } Cantonments of Secunderabad and Aurangabad,
 Rule 4 (3) of Notification No. 34-J., } bad, the Hyderabad Residency Bazaris and the
 dated the 20th April 1915. } Railway lands in the Hyderabad State.
 Rule 3 (3) of Notification No. 99, dated the 19th July 1916, of the Government of Burma applicable to the Northern Shan States.
 Rule 3 (3) of Notification No. 5313, dated the 29th October 1919, of the Agent to the Governor-General in Rajputana.

LIST OF AUTHORIZED EXPLOSIVES.

The following explosives are at present authorized for importation into British India for general sale:—

CLASS 1.—GUNPOWDER.

The term "gunpowder" means gunpowder ordinarily so called.

GUNPOWDER.

CLASS 2.—NITRATE MIXTURE.

The term "nitrate mixture" means any preparation, other than gunpowder ordinarily so called, formed by the mechanical mixture of a nitrate with any form of carbon or with any carbonaceous substance not possessed of explosive properties, whether sulphur be or be not added to such preparation, and whether such preparation be or be not mechanically mixed with any other non-explosive substance, and includes any explosive containing a perchlorate and not being a chlorate-mixture, fulminate or nitro-compound as defined in Rule 1 of the Indian Explosives Rules, 1911.

EVERY BLASTING EXPLOSIVE IN THIS CLASS, IN WHICH NITRATE OF AMMONIUM, NITRATE OF SODIUM OR CHLORIDE OF SODIUM ARE USED AS INGREDIENTS, SHALL BE CONTAINED IN CARTRIDGE WRAPPERS OR CASES (OR IN FIVE-POUND INNER PACKAGES) MADE THOROUGHLY WATERPROOF WITH MELTED PARAFFIN OR OTHER SUITABLE WATERPROOFING MATERIAL.

CHILMORTH SPECIAL POWDER.

CLASS 3.—NITRO-COMPOUND.

The term "nitro-compound" means any chemical compound possessed of explosive properties, or capable of combining with metals to form an explosive compound, which is produced by the chemical action of nitric acid (whether mixed or not with sulphuric acid) or of a nitrate mixed with sulphuric acid upon any carbonaceous substance, whether such compound is mechanically mixed with other substances or not.

The nitro-compound class has two divisions.

EVERY EXPLOSIVE IN THIS CLASS AND EVERY EXPLOSIVE INGREDIENT THEREOF SHALL BE SO THOROUGHLY PURIFIED AND OTHERWISE OF SUCH CHARACTER AS TO SATISFY A TEST KNOWN AS THE HEAT TEST, AND SPECIFIED IN THE RULE FOR TESTING EXPLOSIVES PUBLISHED WITH GOVERNMENT OF INDIA, DEPARTMENT OF COMMERCE AND INDUSTRY, NOTIFICATION No. 4013-33, DATED THE 6TH JUNE 1914, REFERRED TO ABOVE.

EVERY BLASTING EXPLOSIVE IN THIS CLASS, IN WHICH NITRATE OF AMMONIUM, NITRATE OF SODIUM OR CHLORIDE OF SODIUM ARE USED AS INGREDIENTS, SHALL BE CONTAINED IN CARTRIDGE WRAPPERS OR CASES (OR IN FIVE-POUND INNER PACKAGES) MADE THOROUGHLY WATERPROOF WITH MELTED PARAFFIN OR OTHER SUITABLE WATERPROOFING MATERIAL.

DIVISION 1.

Division 1 comprises the following explosives and any chemical compound or mechanically mixed preparation which consists either wholly or partly of nitro-glycerine or of some other liquid nitro-compound.—

Aldeer Gelignite.	Cordite.
A. 1. Monobel. }	Cordite, M. D.
Victor Powder. }	Dynamite.
A. 2 Monobel.	Dynobel.
Viking Powder No 1. }	Farmer's Dynamite.
Viking Powder No 2 }	Gelatine Dynamite.
Ballistite.	Gelignite.
Blasting Gelatine.	Monobel, No. 1.
Cambute.	Revite.
Carbonite.	Samsonite. }
Chilworth Smokeless Powder, No 2.	Saxonite. }

PROVIDED THAT EVERY EXPLOSIVE IN THIS DIVISION SHALL BE OF SUCH CHARACTER AND CONSISTENCY AS NOT TO BE LIABLE TO LIQUEFACTION OR EXUDATION.

PROVIDED ALSO THAT AN EXPLOSIVE WHICH IS REQUIRED BY DEFINITION TO BE ISSUED IN WATERPROOF INNER PACKAGES MAY BE EXEMPTED FROM SUCH REQUIREMENT BY SPECIAL AUTHORITY WHEN AND SO LONG AS THE CONDITIONS OF SUCH AUTHORITY ARE OBSERVED.

DIVISION 2.

Division 2 comprises the following explosives and any nitro-compound as before defined which is not comprised in division 1:—

Amberite, No. 2.	Negro Powder No. 2.
Alumatol. }	Neonite. }
Ammonal }	Remington Dense Powder. }
Chilworth Smokeless Powder.	N. S. Smokeless.
Chilworth Smokeless Sporting Powder	Picric Acid.
Di-nitro-phenol.	Picric Powder.
Economic Smokeless Sporting Powder. }	Pimrose Smokeless. }
E. C. Sporting Powder }	Stonemarket Smokeless. }
Eley Smokeless Sporting Powder. }	Rendite
Empire Powder }	Roburite.
Light Load Smokeless. }	Ruby Powder.
Frankite }	Schultze Cube Powder.
Fulmen Powder. }	Schultze Gunpowder.
Imperial Schultze Gunpowder }	Smokeless Diamond.
Lightning Powder. }	Tonite or Colton Powder.
Guncotton.	Ti-nitro-toluol.
Ideal Powder. }	
Nobel's Special Powder. }	

CLASS 4.—CHLORATE MIXTURE.

*The term "chlorate mixture" means any explosive containing a chlorate.
The chlorate mixture class has two divisions*

EVERY EXPLOSIVE IN THIS CLASS, AND EVERY EXPLOSIVE INGREDIENT THEREOF, SHALL BE SO THOROUGHLY PURIFIED AND OTHERWISE OF SUCH A CHARACTER AS TO SATISFY A TEST KNOWN AS THE HEAT TEST, AND ENCLOSED IN THE RULE FOR TESTING EXPLOSIVES, PUBLISHED WITH GOVERNMENT OF INDIA, DEPARTMENT OF COMMERCE AND INDUSTRY, NOTIFICATION No. 4013-33, DATED THE 6TH JUNE 1914, REFERRED TO ABOVE

EVERY BLASTING EXPLOSIVE IN THIS CLASS, IN WHICH NITRATE OF AMMONIUM, NITRATE OF SODIUM OR CHLORIDE OF SODIUM ARE USED AS INGREDIENTS, SHALL BE CONTAINED IN CARTRIDGE WRAPPERS OR CASES (OR IN FIVE-POUND INNER PACKAGES) MADE THOROUGHLY WATERPROOF WITH MELTED PARAFFIN OR OTHER SUITABLE WATERPROOFING MATERIAL.

DIVISION 1.

Division 1 comprises any chlorate preparation which consists partly of nitro-glycerine or of some other liquid nitro-compound.

Nil.

PROVIDED THAT EVERY EXPLOSIVE IN THIS DIVISION SHALL BE OF SUCH CHARACTER AND CONSISTENCY AS NOT TO BE LIABLE TO LIQUEFACTION OR EXUDATION.

DIVISION 2.

Division 2 comprises any chlorate mixture as heretofore defined, which is not comprised in Division 1.

Nil.

CLASS 5.—FULMINATE.

The term "fulminate" means any chemical compound or mechanical mixture, whether included in the foregoing classes or not, which, from its great susceptibility to detonation, is suitable for employment in percussion caps or any other appliances for developing detonation, or which from its extreme sensibility to explosion, and from its great instability (that is to say, readiness to undergo decomposition from very slight exciting causes) is especially dangerous.

This class consists of two divisions.

DIVISION 1.

Division 1 comprises such compounds as the fulminates of silver and of mercury, and preparations of those substances, such as are used in percussion caps; and any preparation consisting of a mixture of a chlorate with phosphorus or certain descriptions of compounds of phosphorus, with or without the addition of carbonaceous matter, and any preparation consisting of a mixture of a chlorate with sulphur, or with a sulphuret, with or without carbonaceous matter.

Nil.

DIVISION 2.

Division 2 comprises such substances as the chloride and iodide of nitrogen, fulminating gold and silver, diazobenzol, and the nitrate of diazobenzol.

Nil.

CLASS 6.—AMMUNITION.

The term "ammunition" means any explosive of any of the foregoing classes when the same is enclosed in any case or contrivance, or is otherwise adapted or prepared so as to form a cartridge or charge for small-arms cannon or any other weapon, or for blasting or to form any safety or other fuze for blasting or for shells, or to form any tube for firing explosives or to form a percussion cap, detonator, fog-signal, shell, torpedo, war-rocket, or any other contrivance other than a firework.

*The term "percussion cap" does not include a detonator.**

The term "detonator" means a capsule or case which is of such strength and construction and contains fulminate in such quantity, that the explosion of one capsule or case would communicate the explosion to other like capsules or cases.

The term "safety fuze" means a fuze for blasting which burns and does not explode, and which does not contain its own means of ignition, and which is of such strength and construction and contains an explosive in such quantity that the burning of such fuze will not communicate laterally with other like fuzes.

The ammunition class has three divisions.

DIVISION 1.

Nobel's Safety Electric Time Fuze.
Percussion Caps.
Railway Fog Signals.

Safety Cartridges.
Safety Fuzes for Blasting.
Safety Electric Fuzes.

DIVISION 2.

Division 2 comprises any ammunition, as heretofore defined, which does not contain its own means of ignition, and is not included in Division 1.

Cartridges for Cannon, Shells, Mines, Blasting or other like purposes.

Cartridges for Small Arms which are not Safety Cartridges.

Cordeau Bickford.

Electric Fuzes.

Electric Primers.

* In consequence of the results of experiments carried out, it has been decided that a percussion cap can only be properly classed as such if it contains less than 0.6 grain of a composition of the 1st Division of the fifth (Fulminate) Class of which not more than 26 per cent. consists of fulminate of mercury, or less than 0.5 grains of any other explosive of the 1st Division of the 5th (Fulminate) Class, and it has been further decided that percussion caps shall not be classed as such when they contain anvil or have their composition unprotected by tin foil or other suitable substance, as under those circumstances they are liable to explode en masse.

Filled Shells not containing their own means of ignition and closed by a substantial metal plug

Fuze Lighters
Fuzes for Shells.
Instantaneous Fuze
Port Fires.
Tubes for firing Explosives.
Quick Match.
War Rockets.

DIVISION 3.

Division 3 comprises any ammunition as heretofore defined which contains its own means of ignition, and is not included in Division 1.

Cartridges for Small Arms which are not Safety Cartridges.

Detonators.
Electric Detonators.
Friction Tubes.
Fuzes for Shells.
Nobel's Electric Detonator Time Fuze.
Percussion Primers.
Quick firing Ammunition.
Tubes for firing Explosives.

CLASS 7.—FIREWORK.

The term "firework" comprises firework composition and manufactured fireworks.

DIVISION 1.—FIREWORK COMPOSITION.

The term "firework composition" means any chemical compound or mechanically mixed preparation of an explosive or inflammable nature, which is used for the purpose of making manufactured fireworks, and is not included in the former classes of explosives, and also any star and any coloured fire composition, subject to the proviso to the definition of manufactured fireworks.

Nil.

DIVISION 2.—MANUFACTURED FIREWORKS.

MANUFACTURED FIREWORKS, consisting of any explosive of the classes 1, 2, 3, 4 and 6 and any firework composition, when such explosive or composition is enclosed in any case or contrivance or is otherwise manufactured so as to form a squib, cracker, toy cap or amorce, serpent, rocket (other than a war-rocket), waroon, lance, wheel, Chinese fire, Roman candle, or other article specially adapted for the production of pyrotechnic effects, or pyrotechnic signals, or sound signals :

Provided that a substantially constructed and hermetically closed metal case, containing not more than one pound of coloured fire composition of such a nature as not to be liable to spontaneous ignition shall be deemed to be a "manufactured firework" and not a "firework composition."

Aluminium or Magnesium Torches.
Amorce.
Chinese Crackers.
Light Signals.
Magnesium or Aluminium Torches.
Manufactured Fireworks
Pyrotechnic Matches.
Rockets.
Sparklers.

N. L. SHELDON,
Offg. Chief Inspector of Explosives, India.

APPENDIX F.

* List of non-dangerous petroleum installations licensed during the year 1919.

Presidency or Province	District	No	Presidency or Province	District	No
Ajmer-Merwara	Ajmer	4	Bombay	Ahmedabad	7
	Total	4		Ahmednagar	3
Assam	Cachar	3		Belgaum	4
	Darrang	1		Bijapur	6
	Goonpara	1		Bombay	11
	Kamrup	2		Broach	10
	Lakhimpur	2		Dharwar	12
	Nowgong	2		Hyderabad (Sind)	3
	Sibsagar	6		Karnachi	12
	Total	17		East Khandesh	4
Baluchistan	Quetta	3		West Khandesh	8
	Total	3		Kolhapur	3
Bengal	Bankura	1		Nasik	11
	Bogra	4		Poona	5
	Birbhum	1		Satara	8
	Bardwan	9		Sholapur	3
	Calcutta	6		Surat	6
	Chuttigong	3		Thana	3
	Darjeeling	3		Total	114
	Dinajpur	3	Burma	Bassein	1
	Howrah	6		Hanthawaddy	7
	Jalpaiguri	5		Magwe	20
	Khulna	6		Mandalay	4
	Midnapur	2		Mergui	1
	Murshidabad	2		Minba	16
	Nadia	6		Myingyan	7
	Rajshahi	3		Patokku	7
	Rangpur	8		Prome	8
	24-Parganas	9		Tavoy	1
	Total	77		Thayetmyo	6
Bihar and Orissa	Baharore	5	Central Provinces	Upper Chindwin	3
	Bhagalpur	6		Total	81
	Champaran	5		Akola	7
	Cuttack	4		Amroli	8
	Darbhanga	8		Bhandara	7
	Gaya	6		Bilaspur	4
	Manbhum	10		Baldana	10
	Monghyr	3		Damoh	1
	Muzaffarpur	6		Hoshangabad	7
	Patna	6		Jubbulpore	7
	Puri	1		Nagpur	8
	Purnea	8		Narsinghpur	3
	Ranchi	1		Nimar (Khandwa)	7
	Sambalpur	7		Raipur	6
Delhi	Saran	3	Delhi	Saugor	4
	Shahabad	3		Wardha	16
	Singbhum	3		Total	89
	Sonthal Parganas	7		Delhi	7
	Total	87		Total	7

* This list includes godowns for the storage of non-dangerous petroleum regarding which the Department has cognizance.

*List of non-dangerous petroleum installations licensed during a year 1910 - 1911

*List of non-dangerous petroleum installations licensed during year 1-12-1906					
Presidency or Province	District	No.	Presidency or Province.	District	No
Hyderabad . . .	Hyderabad	17		Ambala	11
	Secunderabad	3		Amritsar	5
				Attock	1
	Total	20		Forozepur	1
Madras	Anantapur	5	Punjab	Gujranwala	1
	Bellary	6		Gurdaspur	2
	Chingleput	8		Hoshiarpur	3
	Chittoor	3		Jullundur	0
	Coimbatore	7		Lahore	4
	Cuddapah	2		Ludhiana	6
	Ganjum	5		Lyallpur	2
	Godavari	6		Multan	2
	Guntur	12		Rawalpindi	3
	Kistna	17		Shahpur	4
	Kuracool	4		Sialkot	1
	Madras	7		Total	32
	Madam	7	United Provinces	Agra	5
	Malabar	12		Aligarh	2
	Nellore	3		Allahabad	6
	North Arcot	13		Azamgarh	2
	Ramnad	10		Bahraich	1
	Salem	3		Ballia	1
	South Arcot	15		Ban Banki	1
	South Canara	3		Barcilly	7
	Tanjore	24		Basti	5
	Tinnevely	6		Bonares	4
	Trichinopoly	8		Bijnor	3
	Vizagapatam	5		Cawnpore	1
		Dehra Dun	3		
		Etawah	5		
		Fyzabad	2		
		Ghaziपुर	2		
		Gonda	4		
		Gorakhpur	1		
		Jaunpur	3		
		Jhansi	3		
		Lucknow	4		
		Meerut	2		
		Moradabad	3		
		Muttra	2		
		Partabgarh	5		
		Saharanpur	2		
		Shahjahanpur	8		
		Total	87		
Mysore	Bangalore	13			
	Total	13			
North-West Frontier Province	Hazara	2			
	Peshawar	10			
	Total	12			

*This list includes godowns for the storage of non-dangerous petroleum regarding which this Department has cognizance.

*This list includes godowns for the storage of non-dangerous petroleum regarding which this Department has cognizance										No
SUMMARY.										
Ajmer-Merwara	.	.	.	.	.	.	.	.	.	4
Assam	.	.	.	.	.	.	.	.	.	17
Baluchistan	.	.	.	.	.	.	.	.	.	3
Bengal	.	.	.	.	.	.	.	.	.	77
Bihar and Orissa	.	.	.	.	.	.	.	.	.	87
Bombay	.	.	.	.	.	.	.	.	.	114
Burma	.	.	.	.	.	.	.	.	.	81
Central Provinces	.	.	.	.	.	.	.	.	.	89
Delhi	.	.	.	.	.	.	.	.	.	7
Hyderabad	.	.	.	.	.	.	.	.	.	20
Madras	.	.	.	.	.	.	.	.	.	191
Mysoore	.	.	.	.	.	.	.	.	.	18
North-West Frontier Province	.	.	.	.	.	.	.	.	.	12
Punjab	.	.	.	.	.	.	.	.	.	53
United Provinces	.	.	.	.	.	.	.	.	.	87
Total										854

APPENDIX G.

Summary of non-dangerous petroleum installations and godowns licensed for the ten years ending 1910.

Presidency or Province.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.
Ajmer-Merwara	4	4	4	4	4	1	4	4	4	4
Assam . . . . .	...	...	3	5	5	5	6	13	16	17
Baluchistan	1	2	2	3	3	3	3	3	3	3
Bengal	96	101	99	73	71	69	74	77	70	77
Bihar and Orissa . . . . .	...	...	67	67	68	70	73	79	83	87
Bombay	84	83	86	88	94	99	102	106	111	114
Burma	33	35	41	46	53	58	64	70	77	81
Central Provinces	71	74	81	80	83	81	88	80	90	89
Delhi . . . . .	...	...	...	6	7	7	7	7	7	7
Eastern Bengal and Assam	31	28	...	...	...	...	...	...	...	...
Hyderabad	2	11	12	11	14	17	18	20	20	20
Madras	114	129	138	161	167	173	179	190	194	191
Mysore	10	10	10	11	11	12	12	12	13	13
North-West Frontier Province	3	6	7	7	6	6	6	11	12	12
Punjab	30	35	39	31	35	36	39	45	50	52
United Provinces	61	65	71	79	82	87	90	89	87	87
Total	540	633	630	668	703	730	765	812	816	854

APPENDIX H.

Statement showing the quantity of petroleum imported by sea into British India during the ten years ending 1910.

NON-DANGEROUS PETROLEUM.

Port or Province.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.
	Gallons.	Gallons	Gallons	Gallons.	Gallons	Gallons	Gallons	Gallons.	Gallons	Gallons
Chittagong	6,977,078	7,052,321	9,250,509	9,927,422	9,626,242	10,674,018	10,150,117	11,919,029	13,351,210	13,413,670
Chandbali	259,080	227,400	250,800	396,000	366,000	276,752	218,000	265,000	195,120	222,761
Calcutta	18,642,248	27,069,171	26,468,283	23,720,828	39,913,619	19,221,857	29,073,659	14,012,197	8,812,381	38,015,865
Bombay	21,780,978	27,664,430	22,730,825	46,615,625	26,723,382	22,829,386	23,342,109	22,253,703	28,158,591	49,365,236
Sind	8,295,644	9,689,000	7,274,695	10,043,396	11,570,097	8,991,297	4,610,510	7,905,011	4,177,590	8,853,037
Madras	10,006,706	15,113,257	10,625,192	12,400,817	15,553,314	14,675,714	14,443,009	6,007,618	3,163,182	13,662,183
Durma	1,197,661	1,263,641	1,018,526	1,146,967	1,036,977	1,066,699	582,277	22,224	617,303	264,650
Total	70,109,315	89,067,450	77,681,829	102,167,055	105,053,681	87,715,787	89,619,741	63,329,041	58,476,972	121,827,500

APPENDIX H—contd.

Statement showing the quantity of petroleum imported by sea into British India during the ten years ending 1919—contd.

DAINGEROUS PETROLEUM

Port or Province	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons
Calcutta	11,703	87,690	32,057	349	492	2,110	28,916		52,159	8,385
Dombay	79,661	100,000	469,523	772,066	49,060	48,000	12,009	140,848		40
Sind	28,019	3,627	6,185	8,671	1,531	4,621	2,280			...
Madras	6,450	2,100	4,120			4		221,900		12,000
Burma	550	206	426	240	20		1,000	116	20	34
Total	150,451	190,223	512,333	781,329	50,096	51,738	44,231	265,951	70,375	47,541

Statement showing the quantity of petroleum produced in Burma and transported into British India during the ten years ending 1919.

	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons
Non-dangerous petroleum	85,356,037	100,753,665	100,152,757	109,781,833	106,601,718	106,730,171	111,091,573	112,324,410	119,561,906	101,053,495
Dangerous petroleum	922,481	1,619,527	1,792,616	2,115,242	3,731,374	3,747,261	5,005,123	5,841,063	5,382,723	6,700,479

Statement showing the quantity of petroleum produced in Assam and Burma during the ten years ending 1919.

NON-DAINGEROUS PETROLEUM.

Province	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons
Assam	2,037,772	2,112,749	1,907,935	2,579,009	2,975,976	2,631,455	3,055,793	3,712,901	8,979,752	9,609,974
Burma	113,357,116	149,674,019	161,250,231	181,616,911	178,313,761	171,093,827	176,109,199	175,707,512	176,621,177	170,111,331
Total	115,394,888	151,016,368	163,158,166	184,195,920	181,289,737	173,725,282	179,165,202	179,410,413	185,601,229	179,723,305

DAINGEROUS PETROLEUM.

Province	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons	Gallons
Assam	36,736	60,531	120,000	179,776	217,863	240,213	366,675	461,917	419,735	415,155
Burma	18,215,501	21,228,403	23,166,233	32,775,112	32,231,848	26,129,420	33,159,761	32,485,751	33,075,695	39,528,873
Total	18,252,237	21,288,934	23,286,233	32,954,888	32,449,711	26,369,633	33,526,436	32,947,668	33,551,430	40,044,028

APPENDIX I.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1919 to 31st December 1919.

EXPLOSIVES.

No.	Date of accident.	Nature of Explosive.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS	
					Killed.	Injured.
1	18th January 1919	Gunpowder ...	Sewai, Bombay ...	While blasting operations were being carried on in a quarry at Jackeria Bunder, a stone weighing about 15 lbs flew from the quarry and knocked the head off a Hindu Mahar who was digging the foundation for a building which is to be constructed 150 yards from the quarry. The licensee was prosecuted and fined Rs 50 for not taking adequate precautions before blasting.	1	...
2	19th April 1919 ...	Gunpowder ...	Gogai, Salem ...	Oddars had bored three holes and filled them with country powder to blast the rocky bed of a well and two out of the three holes exploded. The workmen did not notice that one of the three charges failed to explode and when they commenced boring some more holes the next day they happened to bore a hole close to the unexploded charge, which exploded causing fatal injuries to one of the men.	1	...
3	20th July 1919 ...	Gunpowder ...	Elanagai, Salem...	Four persons were evidently manufacturing gunpowder for blasting when an explosion occurred fatally injuring one man and injuring two others. The fourth man disappeared. The Police found it difficult to procure evidence to lay a charge against the persons concerned.	1	2
4	19th August 1919	Gunpowder ..	Elanagar, Salem ...	Three men who were engaged in sinking a well, burnt some palmyra fruit and were eating them, when some powder that was lying near by caught fire and exploded, fatally injuring one man and injuring the 2 others.	1	2
5	26th October 1919	Gunpowder ...	Chidambaram ...	In a part of a temple a number of persons, suspecting that one of the servants had stolen a quantity of temple oil, searched the temple with a lighted torch and while searching they found a tin and wanted to see what it contained with the help of the torch. The tin happened to contain gunpowder and a spark from the torch fell on the gunpowder and caused an explosion. The temple walls fell in and four persons were buried under the debris. Altogether 16 persons were injured, four of whom died. This gunpowder was kept for temple Athiravadies.	4	12
TOTAL ...					8	16
6	4th January 1919	Dynamite ...	Bunkhara cutting	Two coolies while drilling a hole for blasting were injured by the accidental explosion of a misfired cartridge which was buried about 3 inches away.	...	2
7	25th January 1919	Nitro-compound...	Kiul ...	Three coolies who were engaged in transhipping coal from a wagon standing on the weigh bridge line at Kiul, set fire to some coal near the wagon and set round it to warm themselves. Some explosive substance (probably part of an unexploded nitro-compound cartridge used in blasting) in the fire exploded with the result that one cooly was seriously injured in the right eye and two others slightly.	...	3

APPENDIX I—*contd.*

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1919 to 31st December 1919.

EXPLOSIVES.

No.	Date of accident.	Nature of Explosive	Where accident occurred.	Circumstances of accident so far as ascertained.	Number of Persons	
					Killed	Injured
8	28th March 1919	Dynamite	Near Nischitpur Block, East Indian Railway.	During blasting operations the previous day, one charge failed to explode. The misty warned the contractors agent and all the coolies that the hole was not to be touched. In spite of this on the following day a cooly attempted to remove the cartridge from the hole with the result that it exploded blowing off the greater portion of his right hand. The hand had to be amputated.	...	
9	26th December 1919	Gelatine Dynamite	Rahha Hills	A blaster was engaged in charging shot holes with Gelatine Dynamite in an underground stop of the Cape Copper Company's mine. After placing the Gelatine Dynamite in six of the nine holes, he was ramming the first two cartridges into the seventh hole by means of a wooden tamping rod, when an explosion occurred. The man was killed on the spot, a driller and his labourer were severely injured and another labourer was slightly hurt. It is presumed that the cartridges were exuding Nitro-glycerine owing to the excessive liquefaction of Nitrate of soda and the blaster using a deal of force in ramming the cartridge, caused the explosion.	1	
Total					1	
10	1st January 1919	Fireworks	Madras	A fire was caused in the Madras Park by some burning pieces of fireworks falling upon the fire engine shed within the enclosure and a booth next to it. The fire engine failed owing to a sudden defect. Neighbouring booths were torn down to prevent the spread of fire which was extinguished by another engine—altogether 10 sheds were destroyed by fire. Immediately on the outbreak of fire there was a stampede to the ticket gate and during this crush a girl of 13 years of age fell down and died from the shock of injuries received. An old woman, four very small children and a girl of 16 also suffered from slight injuries or shock and were sent to hospital where all recovered. Three men were also sent to hospital as outpatients of whom one received slight burns while helping to put out the fire.	1	
11	9th February 1919	Firework Composition	Calcutta	Two Indians filled an iron pipe with a small quantity of a composition, believed to be a sulphur chlorate mixture, ramming it in with an iron rod when there was an explosion which caused injuries on the face, hands and fingers of one of the men.	...	

APPENDIX I—contd.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department
from 1st January 1919 to 31st December 1919.

EXPLOSIVES

No.	Date of accident.	Nature of Explosive.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS	
					Killed	Injured
12	4th June 1919	Fireworks	Rangoon	A party consisting of seven lascars and a gunner were sent to clean out the store room on the Royal Indian Marine Service "Mayo" where all kinds of rockets and fireworks, used for signalling, were kept. Shortly after they entered the room there was a very violent explosion which enveloped the whole of the after hatch and main deck in acid smoke. The fire was put out at once, but before this the gunner and lascars were brought up on deck. A Lieutenant who was passing the hatch at the time of the explosion was also badly injured. The Lieutenant, gunner and 5 injured lascars were taken to hospital. The cause of the explosion was due to the gunner testing one of the rockets which suddenly started up and fell out of hand into a case of rockets which exploded. Out of a case containing fifteen rockets, fourteen had exploded.	...	7
13	16th October 1919	Fireworks	Calcutta	It was reported that an Indian lad had been watching the experiment of a <i>Tubri</i> set fire to close by, with a phial containing a mixture of chlorate of potash and realgar in his hand, when the contents of the phial suddenly exploded, resulting in the loss of the index finger of his left hand and part of the same of the right. The lad could not explain how the explosion actually occurred.	...	1
TOTAL					1	18

APPENDIX I—contd.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1919 to 31st December 1919

PETROLEUM.

No	Date of accident.	Nature of Oil	Where accident occurred	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS	
					Killed.	Injured.
14	27th January 1919	Powerin	Bombay	At Victoria Terminus on 27th January 1919 a railway wagon loaded with 250 cases of "Powerin" was noticed to be on fire. The fire was extinguished. Out of 500 tins in the wagon 486 were found, 124 were found slightly leaking and 10 completely empty. Two coolies sustained burns.	.	.
15	30th March 1919	Crude Oil	Khodanung	At about 8-10 a.m. at the Burma Oil Company stock tank No. 5 Khodanung (500,000 gallons) took fire and exploded and burnt itself out in about 2 hours without causing damage to any of the adjacent tanks. All oil had been previously run out of the tank leaving only about 10% of silt and it was while this silt was being removed that the accident occurred. In all 88 coolies were injured of whom 2 died. The probable cause of the fire due to some one smoking near by.	2	.
16	8th May 1919	Kerosine	Bombay	A woman aged 21 years was lighting a primus stove when the flames shot up and set her "Sari" on fire. Her husband who was in the room at the time tore the clothes from her body and put out the fire but not before his wife had received severe burns about her legs and hands. Both refused to go to a public hospital and were privately treated.	...	.
17	11th May 1919	Petroleum	Digboi	During a thunderstorm a derrick in the Assam Oil Company's field was struck by lightning and burnt down together with the contents of the tank at the well head. No one was injured.	...	.
18	17th May 1919	Kerosine	Satur	During a thunderstorm a flash of lightning struck the Burma Oil Company's non-dangerous non-bulk petroleum depot and set fire to it. It is reported that the lightning first struck a tree standing about 100 feet from the depot. It was found after the fire had been extinguished that 10 drums, 20 tins and 12 cases of Kerosine were damaged. One of the walls of the depot and that of the office room were slightly cracked.	...	.
19	29th May 1919	Kerosine	Tondimpet	A fire broke out in the filling shed of the Burma Oil Company's installation and was caused by a coolie's head cloth, which was saturated with oil coming in contact with a hot soldering bolt while he was engaged in soldering. In all about 30 tins of Kerosine oil were destroyed. There were no casualties and the fire was extinguished by means of sand in about half an hour.	...	.

Appendix I—*contd.*

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1919 to 31st December 1919

PETROLEUM.

No	Date of accident.	Nature of Oil.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS.	
					Killed.	Injured.
20	6th June 1919	Petrol	Podanur	A covered goods wagon loaded with 800 cases and 420 drums of petrol, while standing in Podanur Railway junction yard, took fire at 3-30 o'clock resulting in the Petrol being completely burnt and adjoining two vehicles damaged. A watchman who was passing by with a lighted lamp had the outer portion of his left forearm burnt. The fire was no doubt caused by the watchman passing with an ordinary lamp near the wagon, from which petrol was leaking. This kind of accident is an absolute certainty if ordinary lamps are brought anywhere near the spot where there is a leakage.	...	1
21	19th June 1919	Petrol	Itarsi	A jar of petrol protected by a canteen fell from the hands of a luggage porter and broke, and the petrol ignited thereby, seriously injured the porter who subsequently died and slightly injured a parcel clerk, also damaged about 30 Mangalore tiles of the parcel office and burning about 20 parcels. It is surmised that while the jar was being removed from his head by the porter in the parcel office, a light which the porter was, it is thought, smoking at the time, fell on the petrol, igniting the same.	1	1
22	5th July 1919	Petroleum	Rangoon river opposite Seikkyi.	A barge was taken to Seikkyi on the 4th July and loading with oil and petrol was at once commenced and went on till 6 p.m. Loading continued on the 5th and was completed at noon on that day. The barge was then taken out into the creek and tied up to a buoy. At about 4 p.m. the cook came on board the barge with the food for the crew, but he was apparently not searched for matches though the crew were searched before work began. After every one had finished their food the cook went into the hold where one of the crew was sleeping and very shortly after an explosion took place. The cook was so severely burnt that he died in hospital while the other man who was in the hold was also burnt. It is probable that the cook and the other man went into the hold to have a quiet smoke and one of them struck a match which ignited the petroleum vapour, causing the explosion.	1	1
23	30th July 1919	Petrol	Dawbong, Rangoon.	An explosion occurred on the motor launch "Norah" while she was under repairs at the Government Dockyard. It was found that a lantern was smoking a hookah, the sparks from which fell on or near the carburettor causing the explosion. The lantern was slightly burnt on the left arm, face and chest.	...	1
24	29th November 1919.	Petrol	Ambur.	A wagon containing 1230 gallons of petrol was noticed to be on fire while the train was standing on the main line in the station yard. The contents of the wagon were totally burnt. It is presumed that the fire was caused through a leak through the floor joints of the wagon, which was set alight when passing over glowing cinders raked out of the engine at Mailpatti, a station before Ambur.	...	...

Appendix I—contd.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1919 to 31st December 1919.

PETROLEUM.

No	Date of accident.	Nature of Oil.	Where accident occurred	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS	
					Killed	Injured
25	6th December 1919	Petroleum	Bene Reserve, Yenangyang	At about 6 a.m. 11 carpenters commenced their daily work of erecting a rig. Shortly afterwards one of these carpenters, a man with many years of experience, crawled under a shelter some 60 feet away and there commenced to smoke. He set fire to himself and ran into a neighbouring stream full of oil and gas which he set on fire. The fire spread at great speed up and down the stream and though it was quickly confined it was impossible to save these rigs which had got well alight. The total destruction of property amounted to 12 rigs totally destroyed and one partly so and of human life, in addition to the carpenter 10 others died of injuries received and 11 others suffered injuries.	11	11
Total					15	50

Appendix I—*contd.*

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1919 to 31st December 1919.

CHEMICALS.

No.	Date of accident.	Nature of Chemical.	Where accident occurred.	Circumstances of accident so far as ascertained.	NUMBER OF PERSONS.	
					Killed.	Injured.
28	20th October 1919.	Carbide of Calcium	Kidderpore Docks, Calcutta.	See page 4 of report	5	...
				Total	5	...

Appendix I—contd.

Accidents by fire or explosion which have been brought to the notice of the Explosives Department from 1st January 1919 to 31st December 1919

MISCELLANEOUS.

No.	Date of accident.	Nature of Substance	Where accident occurred	Circumstances of accident so far as ascertained	NUMBER PERSONS	
					Killed.	
27	11th April 1919	Matches	Kanaung, Rangoon	At about 4 P.M. while four Burmans were striking matches in a godown one of them pushed a wicker basket with his foot along the cement floor. The basket contained loose matches. Evidently some loose matches were underneath and in doing so the friction set up caused the matches to blaze up and set fire to the loose matches in the basket and the packages of matches stacked in the godown. The matches flared up so suddenly that the four persons were burnt. Three were sent to hospital two of whom subsequently died. One of them was only slightly burnt and did not attend hospital.	2	
28	9th August 1919	Do	Cakutta	102 cases of Japanese matches were discharged from a steamer and loaded in a boat at the Jetty. At about 3 A.M. one of the cases ignited while being rolled on to a sling to be hoisted. The fire was immediately extinguished with buckets of water, after which the case was hoisted on to the Jetty. On examination the case was found intact outside, but the contents were burnt and the woodwork inside slightly scorched. It was reported that the wooden case containing the match boxes was lined inside and the match boxes so closely packed as to render it almost impossible for a match to get liberated.	—	—
29	12th October 1919	Do.	Guntakal	A deal wood case covered with gunny was received at Guntakal station from Bellary. It was placed on the top of three other cloth bundles and the chief parcel clerk pulled it thinking that it was an ordinary cloth bundle, when the parcel fell it caught fire and on examining it it was found to contain coloured matches, red and green.	—	—
Total					2	

APPENDIX I—concl'd.

Summary of accidents during the year 1919.

Explosives or dangerous and inflammable substances.	ACCIDENTS CAUSING LOSS OF LIFE AND BODILY INJURY.			Accidents not causing loss of life or bodily injury.	Total number of accidents.
	Number of accidents.	NUMBER OF PERSONS			
		Killed.	Injured.		
EXPLOSIVES					
Gunpowder	5	8	16	..	5
Nitro-compounds	4	1	9	..	4
Fulminates . . . . .	...	...	...	..	...
Ammunition . . . . .	...	...	...	..	...
Fireworks	4	1	18	...	4
TOTAL	13	10	43	..	13
PETROLEUM					
Petroleum generally	8	15	50	4	12
TOTAL	8	15	50	4	12
CHEMICALS					
Chemicals	1	5	...	...	1
TOTAL	1	5	...	..	1
MISCELLANEOUS					
Miscellaneous	1	2	2	2	3
TOTAL	1	2	2	2	3
GRAND TOTAL	21	32	95	6	29

APPENDIX J.

Detailed statement showing the number of accidents and persons killed and injured during the ten years ending 1919.

YEAR.	GUNPOWDER.			DYNAMITE AND OTHER NITRO COMPOUND BRISTING EXPLOSIVES			FULMINATES.			AMMUNITION			FIREWORKS.		
	Number of accidents.	Persons killed.	Persons injured.	Number of accidents.	Persons killed.	Persons injured.	Number of accidents.	Persons killed.	Persons injured.	Number of accidents.	Persons killed.	Persons injured.	Number of accidents.	Persons killed.	Persons injured.
1910	9	10	11	4	1	4	..	..	..	..	..	..	21	30	58
1911	9	11	8	4	4	29	..	..	..	..	..	..	17	13	34
1912	10	18	6	5	5	35	..	..	..	1	..	1	12	4	16
1913	15	12	25	3	2	1	..	..	..	1	..	1	14	14	26
1914	8	6	7	3	..	5	..	..	..	..	..	..	6	5	21
1915	2	2	3	2	2	..	1	..	1	1	..	1	4	2	3
1916	3	2	3	..	..	..	1	..	1	..	..	..	1	..	1
1917	6	9	7	1	..	1	..	..	..	5	..	5	1	1	..
1918	4	12	5	4	1	8	..	..	..	4	4	3	1	1	..
1919	5	8	16	4	1	9	..	..	..	..	..	..	4	1	18
TOTAL	71	68	91	30	16	93	2	..	2	12	4	11	81	71	167
AVERAGE	7	9	9	3	2	9	2	..	2	1	1	1	9	7	17